

PX 505

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

SECURITIES AND EXCHANGE
COMMISSION,

Plaintiff

v

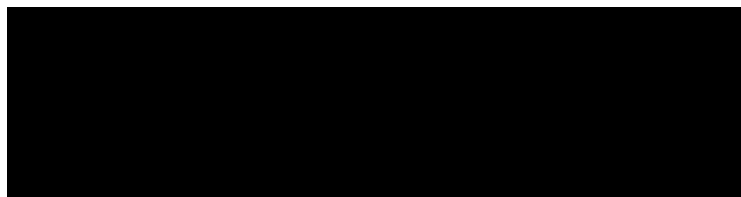
RIPPLE LABS, INC., BRADLEY
GARLINGHOUSE, AND
CHRISTIAN A. LARSEN,

Defendants

20 Civ. 10832

SUPPLEMENTAL EXPERT REPORT OF

 **Ph.D.**



FEBRUARY 28, 2022

CONTENTS

A. Background and Assignment 1

B. Summary of Opinions 2

C. But-For the Ripple Events, XRP Prices Would Have Rarely Exceeded \$0.02 3

D. Investment Returns around Ripple Events are Substantially Greater than
Otherwise 9

I. Background and Assignment

1. I have been retained by the Securities and Exchange Commission ("SEC") to provide expert opinions in the matter captioned above. I previously submitted an expert report on October 4, 2021 which was amended on October 6, 2021 ("**[REDACTED]** Report") in which I performed an empirical analysis of XRP's price movements and assessed whether certain news and public statements of actions related to Ripple Labs, Inc. ("Ripple") impacted XRP prices. My qualifications, publications, and prior testimonies are described in the **[REDACTED]** Report.
2. Dr. Allen Ferrell submitted a report on October 4, 2021 ("Ferrell Report"). I was asked by the SEC to respond to certain opinions in that report, and I submitted a rebuttal report on November 12, 2021 ("**[REDACTED]** Rebuttal Report").
3. As rebuttals to the **[REDACTED]** Report, M. Laurentius Marais, Ph.D. and Daniel R. Fischel submitted separate expert reports on behalf of Ripple on November 12, 2021 (the "Marais Report" and "Fischel Report," respectively). However, neither Dr. Marais nor Prof. Fischel conducted any independent empirical analysis of XRP price data. None of the analyses or conclusions in the Marais Report or the Fischel Report have caused me to change any of the opinions I have offered in this matter.
4. Since submitting the **[REDACTED]** Rebuttal Report, I have been asked by the SEC to provide additional quantification of the economic significance of the impact that certain news related to Ripple had on XRP prices.
5. My opinions are based on my knowledge and expertise gained during my professional career, my academic training and research, and the data I have analyzed in this engagement. In forming my opinions in this matter, I have considered certain documents provided to me. Those documents and materials I relied upon for the **[REDACTED]** Report were identified in Appendix B to that report and any additional documents or materials relied upon the **[REDACTED]** Rebuttal Report were identified in Appendix A to that report. A list of additional documents I have relied upon in forming the opinions presented in this supplemental report is attached as Appendix A.
6. The opinions stated in this report are based on the evidence that has been provided to me to date. I reserve the right to modify or supplement my conclusions as additional information is made available to me, or as I perform further analysis. **[REDACTED]** \$600 for my time in this matter. Staff at The Brattle Group have assisted me by performing work at my direction. My opinions are my own, and neither The Brattle Group's nor my compensation are dependent on my opinions or the outcome of this matter.

II. Summary of Opinions

7. The [REDACTED] Report demonstrates that XRP prices reacted to certain news and public statements related to Ripple.¹ In what follows I will quantify the economic significance of those XRP price reactions.
8. For the purposes of the analysis presented below, I begin with the 113 events on 105 unique days represented by the Select Categories analysis in the [REDACTED] Report.² To be conservative, I remove from that set 5 instances of Digital Asset Trading Platform Listings which I could not definitively attribute to the efforts of Ripple Labs based on the set of news I analyzed.³ The final set of events I study below thus numbers 108 events on 100 unique days. I will refer to these as the “Ripple Events” and the “Event Days,” respectively.
9. My findings are as follows:

- **But-for the news and public statements related to Ripple to which XRP prices reacted in a statistically significant way, the USD price per XRP token would have rarely exceeded \$0.02.**

Figure 1 below presents the results for the Constant Mean Return Model (Model 1), described in the [REDACTED] Report,⁴ when the statistically significant abnormal returns associated with Ripple Events are removed from the price history of XRP and a counterfactual price history is constructed (i.e., a price history of XRP “but-for” the statistically significant price reactions to the Ripple Events).

As shown in the first column of Figure 1, from May 5, 2014 (the first news day I evaluate) through October 28, 2020 (the last news day I evaluate),⁵ the average actual XRP price was \$0.2136, while the 95th percentile actual price was \$0.7003.⁶ However, as shown in the second column of Figure 1, when the abnormal returns associated with the 23 statistically significant Ripple Events⁷ are removed from this history of 2,369 days, the resulting counterfactual XRP price would be just \$0.0044 on average and the 95th percentile counterfactual price would be just \$0.0121. Put differently, but-for the news related to Ripple on just 23 days, the XRP price

¹ [REDACTED] Report, ¶ 12a.

² The Select Categories combines events from the Milestone, Trading Platform Listings, Customer & Product, Acquisitions & Investments, and Ripple Commercial Initiatives categories. See [REDACTED] Report, ¶ 98.

³ [REDACTED] Report, Figure 16. Including these 5 additional listing events would make the results presented herein stronger.

⁴ [REDACTED] Report, ¶¶ 39 and 43.

⁵ See Brattle Workpapers.

⁶ This means that the actual price of XRP was less than \$0.7003 for 95% of the time between May 5, 2014 and October 28, 2020, inclusive, and exceeded \$0.7003 for only 5% of the time during this period.

⁷ Among the 100 Event Days, 23 are associated with significant positive XRP returns. See Brattle Workpapers.

would have rarely surpassed about a penny, and it would never have reached the actual high of \$3.38.

FIGURE 1: ACTUAL VS. COUNTERFACTUAL XRP PRICE COMPARISON

	Actual XRP Prices	Counterfactual XRP Prices
Average Price	\$0.2136	\$0.0044
Standard Deviation	\$0.3104	\$0.0042
5 th Percentile	\$0.0048	\$0.0003
10 th Percentile	\$0.0054	\$0.0004
25 th Percentile	\$0.0068	\$0.0007
Median	\$0.1848	\$0.0038
75 th Percentile	\$0.3018	\$0.0067
90 th Percentile	\$0.4754	\$0.0091
95 th Percentile	\$0.7003	\$0.0121
Maximum	\$3.3800	\$0.0279

Note: Counterfactual prices calculated by removing abnormal returns related to 23 Ripple Event Days.

- Purchasing XRP before the release of the news and public statements related to Ripple on the 100 Event Days would have resulted in greater investment returns than purchasing at other times.** As shown in Figure 7 below, buying XRP at the closing price the day before the 100 Event Days and then selling 28 days later would have generated an average return on investment of 63.1%, compared to just 7.5% if Event Days are not included.

III. But-For the Ripple Events, XRP Prices Would Have Rarely Exceeded \$0.02

10. The [REDACTED] Report establishes that XRP prices react to certain news and public statements related to Ripple.⁸ Put another way, we can interpret statistically significant abnormal returns following the Event Days as attributable to those public statements.⁹ As such, the best estimate of the but-for,

⁸ [REDACTED] Report, ¶ 12a.

⁹ See, *also*, John Y. Campbell, Andrew W. Lo, and A. Craig MacKinlay, “The Econometrics of Financial Markets,” 2nd Edition, 1996, p. 151 (“To appraise the event’s impact we require a measure of the abnormal return.”) and p. 157 (“We interpret

counterfactual XRP price is found by replacing the *actual* returns in those instances with the *expected* returns. Doing so tells us what XRP prices would have been but-for the news about Ripple on Event Days associated with significant abnormal returns.¹⁰

11. For example, on May 16, 2017, Ripple announced its intention to escrow 55 billion XRP tokens.¹¹ The XRP price closed that day at \$0.3499, compared to the prior day's close of \$0.2707, representing a one-day return of about 25.7%.¹² According to the Constant Mean Return Model (Model 1), the expected return for this day was just 1.8%.¹³ This means the abnormal (or unexpected) return was 23.9% on May 16, 2017.¹⁴ This abnormal return is statistically significant at the 5% level.¹⁵ The counterfactual closing price for May 16, 2017 – that is, the XRP price but-for Ripple's announcement – would be just \$0.2756 (the prior day's price plus the *expected* 1.8% return).¹⁶ Subsequent XRP prices would therefore be lower, since all future returns would be applied beginning from this new price.
12. In order to construct a full counterfactual price series, I adopt the following methodology. Considering each of the 100 Event Days, if the one-day abnormal return is statistically significant at the 5% one-sided level and positive, I replace the actual return with the expected return.¹⁷ If the two-day cumulative abnormal return is similarly positive and significant (and the one-day return is not significantly negative), I replace the actual return for those two days with their respective expected returns. Finally, if the three-day cumulative abnormal return is similarly positive and significant (and neither the one-day nor the two-day is significantly negative), I replace the actual return for those three days with their expected returns.¹⁸ If none of those (cumulative) abnormal returns is significant and positive, or if any is

the abnormal return over the event window as a measure of the impact of the event on the value of the firm (or its equity).”).

¹⁰ This is precisely the analysis which Prof. Fischel endorses. Without conducting any analysis of XRP prices, Prof. Fischel questions the extent to which XRP holders profited from the events studied in the [REDACTED] Report, even assuming the abnormal returns related to those events are the results of Ripple's efforts. Fischel Report, ¶ 18.

¹¹ Brad Garlinghouse, “Ripple to Place 55 Billion XRP in Escrow to Ensure Certainty of Total XRP Supply,” ripple.com insights, May 16, 2017, accessed 10/4/2021, <https://ripple.com/insights/ripple-to-place-55-billion-xrp-in-escrow-to-ensure-certainty-into-total-xrp-supply/>.

¹² The investment return is found as $0.2926 = 0.3499 / 0.2707 - 1$. Following common practice, the modeled return in my analysis is found as $0.25664 = \ln(0.3499) - \ln(0.2707)$. See Brattle Workpapers.

¹³ $0.01787 = 0.1422/0.01398 - 1$. See Brattle Workpapers.

¹⁴ This is found as $0.23876 = 0.25664 - 0.017874$.

¹⁵ See [REDACTED] Report, FN 1 and Section V.E and Brattle Workpapers.

¹⁶ This is found as $0.2756 = \exp(\ln(0.2707) + 0.017874)$.

¹⁷ For ease of exposition, I focus only on the parametric evaluation of statistical significance, as discussed in the [REDACTED] Report. See [REDACTED] Report, ¶ 62.

¹⁸ [REDACTED] Report, ¶ 61.

significant and negative, I do not adjust the returns. I do this for each of the twenty regression models detailed in the [REDACTED] Report.¹⁹

13. Following this procedure, I adjust returns of about two dozen events (23 events) out of about 2,400 days. Prof. Fischel argues that “at face value” two dozen events cannot amount to much of economic significance.²⁰
14. I also consider the implications of just examining the one day abnormal return and not giving any credit to significant abnormal returns for longer horizons. This leads me to adjust just 14 returns associated with 14 events.²¹ This is a very conservative approach to the extent it takes the XRP price longer than a day to reflect new information.
15. Having removed the significant abnormal returns I then recalculate the XRP price history. The result for Model 1 is presented below in Figure 2. In this case, I adjust returns associated with just 23 of the 100 unique Event Days.²² The results are striking, and demonstrate the economic significance of these 23 events. The counterfactual price almost cannot be seen on Figure 2 when compared to the actual price. This analysis shows that approximately two dozen events are, in fact, economically significant.

¹⁹ [REDACTED] Report, Figure 7.

²⁰ Fischel Report, ¶ 20 (“In other words, taken at face value, the findings of Dr. Metz’s event study methodology do not demonstrate that XRP holders profit solely or primarily from the efforts of Ripple.”).

²¹ See Brattle Workpapers.

²² Recall that in some cases I may adjust just one day’s return, sometimes two, and sometimes three depending on the indications of statistical significance of those (cumulative) abnormal returns.

FIGURE 2: ACTUAL VS. COUNTERFACTUAL XRP PRICES
2014 - 2020



16. Figure 3 summarizes the results across all twenty models. The maximum 95th percentile counterfactual price is just \$0.0242, meaning that XRP prices would have only rarely exceeded about two cents but-for the news or public statements related to Ripple Labs. Recall that the actual 95th percentile price over this period was \$0.7003, almost 30 times greater.

FIGURE 3: COUNTERFACTUAL XRP PRICE SUMMARY

	No. of Significant Events	Percentile Price									
		Average	Standard Deviation	5 th	10 th	25 th	Median	75 th	90 th	95 th	Maximum
Actual Price	0	\$0.2136	\$0.3104	\$0.0048	\$0.0054	\$0.0068	\$0.1848	\$0.3018	\$0.4754	\$0.7003	\$3.3800
Counterfactuals											
Model 1	23	\$0.0044	\$0.0042	\$0.0003	\$0.0004	\$0.0007	\$0.0038	\$0.0067	\$0.0091	\$0.0121	\$0.0279
Model 2	22	\$0.0059	\$0.0060	\$0.0006	\$0.0008	\$0.0017	\$0.0044	\$0.0078	\$0.0134	\$0.0161	\$0.0598
Model 3	24	\$0.0034	\$0.0033	\$0.0002	\$0.0003	\$0.0005	\$0.0029	\$0.0052	\$0.0071	\$0.0091	\$0.0219
Model 4	20	\$0.0058	\$0.0054	\$0.0007	\$0.0010	\$0.0017	\$0.0044	\$0.0077	\$0.0130	\$0.0159	\$0.0478
Model 5	23	\$0.0048	\$0.0043	\$0.0005	\$0.0006	\$0.0010	\$0.0042	\$0.0072	\$0.0100	\$0.0130	\$0.0279
Model 6	20	\$0.0067	\$0.0065	\$0.0013	\$0.0016	\$0.0025	\$0.0048	\$0.0083	\$0.0143	\$0.0170	\$0.0704
Model 7	21	\$0.0061	\$0.0055	\$0.0009	\$0.0011	\$0.0018	\$0.0048	\$0.0080	\$0.0140	\$0.0167	\$0.0453
Model 8	19	\$0.0080	\$0.0082	\$0.0017	\$0.0021	\$0.0032	\$0.0051	\$0.0087	\$0.0184	\$0.0229	\$0.0880
Model 9	24	\$0.0037	\$0.0033	\$0.0004	\$0.0005	\$0.0008	\$0.0033	\$0.0056	\$0.0078	\$0.0102	\$0.0219
Model 10	21	\$0.0060	\$0.0055	\$0.0011	\$0.0013	\$0.0021	\$0.0046	\$0.0079	\$0.0129	\$0.0158	\$0.0534
Model 11	24	\$0.0039	\$0.0040	\$0.0002	\$0.0002	\$0.0004	\$0.0035	\$0.0056	\$0.0080	\$0.0109	\$0.0279
Model 12	23	\$0.0053	\$0.0056	\$0.0005	\$0.0007	\$0.0014	\$0.0044	\$0.0074	\$0.0110	\$0.0143	\$0.0576
Model 13	24	\$0.0039	\$0.0040	\$0.0002	\$0.0002	\$0.0004	\$0.0034	\$0.0056	\$0.0080	\$0.0108	\$0.0279
Model 14	22	\$0.0049	\$0.0045	\$0.0005	\$0.0006	\$0.0012	\$0.0042	\$0.0072	\$0.0104	\$0.0134	\$0.0332
Model 15	22	\$0.0044	\$0.0039	\$0.0005	\$0.0006	\$0.0010	\$0.0042	\$0.0061	\$0.0083	\$0.0112	\$0.0279
Model 16	21	\$0.0077	\$0.0092	\$0.0019	\$0.0023	\$0.0033	\$0.0052	\$0.0085	\$0.0142	\$0.0207	\$0.1156
Model 17	20	\$0.0067	\$0.0057	\$0.0013	\$0.0016	\$0.0026	\$0.0050	\$0.0083	\$0.0145	\$0.0175	\$0.0505
Model 18	20	\$0.0091	\$0.0106	\$0.0024	\$0.0028	\$0.0041	\$0.0054	\$0.0100	\$0.0189	\$0.0242	\$0.1290
Model 19	24	\$0.0045	\$0.0041	\$0.0005	\$0.0006	\$0.0010	\$0.0041	\$0.0066	\$0.0088	\$0.0116	\$0.0279
Model 20	24	\$0.0049	\$0.0044	\$0.0007	\$0.0009	\$0.0014	\$0.0041	\$0.0069	\$0.0102	\$0.0133	\$0.0332

17. If I limit my attention only to significant one-day abnormal returns (and thus ignore the extent to which prices might have adjusted after the closing of the Event Day) I continue to see the substantial impact that news or public statements about Ripple Labs has had on XRP prices. Figure 4, below, compares actual XRP prices with the counterfactual price according to Model 1. In this case, I am removing the abnormal returns of just 14 days out of 2,369. The counterfactual price is still substantially lower than actual XRP prices, never exceeding \$0.3276.

FIGURE 4: ACTUAL VS. COUNTERFACTUAL XRP PRICES (ONE-DAY APPLICATION)



18. Figure 5 summarizes the results of this conservative, one-day application across all twenty models. The maximum 95th percentile counterfactual price is just \$0.1271 (compared to the actual 95th percentile price of \$0.7003), meaning that removing the abnormal returns in the hours following announcements on just 14 days, XRP prices would have only rarely exceeded about twelve cents.

FIGURE 5: COUNTERFACTUAL XRP PRICE SUMMARY (ONE-DAY APPLICATION)

	No. of Significant Events	Percentile Price									
		Average	Standard Deviation	5 th	10 th	25 th	Median	75 th	90 th	95 th	Maximum
Actual Price	0	\$0.2136	\$0.3104	\$0.0048	\$0.0054	\$0.0068	\$0.1848	\$0.3018	\$0.4754	\$0.7003	\$3.3800
Counterfactuals											
Model 1	14	\$0.0244	\$0.0289	\$0.0038	\$0.0044	\$0.0056	\$0.0165	\$0.0321	\$0.0477	\$0.0679	\$0.3276
Model 2	15	\$0.0284	\$0.0377	\$0.0038	\$0.0044	\$0.0056	\$0.0167	\$0.0375	\$0.0571	\$0.0846	\$0.4340
Model 3	15	\$0.0234	\$0.0273	\$0.0037	\$0.0045	\$0.0059	\$0.0161	\$0.0306	\$0.0453	\$0.0642	\$0.3101
Model 4	14	\$0.0294	\$0.0359	\$0.0037	\$0.0045	\$0.0059	\$0.0199	\$0.0396	\$0.0587	\$0.0834	\$0.4027
Model 5	13	\$0.0293	\$0.0357	\$0.0040	\$0.0047	\$0.0061	\$0.0218	\$0.0383	\$0.0577	\$0.0839	\$0.4047
Model 6	12	\$0.0373	\$0.0474	\$0.0040	\$0.0047	\$0.0061	\$0.0283	\$0.0499	\$0.0754	\$0.1100	\$0.5309
Model 7	13	\$0.0339	\$0.0422	\$0.0041	\$0.0047	\$0.0061	\$0.0256	\$0.0450	\$0.0677	\$0.0984	\$0.4748
Model 8	12	\$0.0400	\$0.0509	\$0.0041	\$0.0047	\$0.0061	\$0.0307	\$0.0539	\$0.0810	\$0.1178	\$0.5684
Model 9	14	\$0.0272	\$0.0326	\$0.0038	\$0.0046	\$0.0059	\$0.0202	\$0.0356	\$0.0531	\$0.0765	\$0.3694
Model 10	13	\$0.0333	\$0.0413	\$0.0038	\$0.0046	\$0.0059	\$0.0248	\$0.0449	\$0.0665	\$0.0957	\$0.4620
Model 11	14	\$0.0236	\$0.0278	\$0.0037	\$0.0044	\$0.0056	\$0.0161	\$0.0309	\$0.0459	\$0.0654	\$0.3156
Model 12	15	\$0.0288	\$0.0392	\$0.0033	\$0.0042	\$0.0056	\$0.0172	\$0.0374	\$0.0555	\$0.0885	\$0.4540
Model 13	15	\$0.0228	\$0.0265	\$0.0036	\$0.0044	\$0.0058	\$0.0158	\$0.0296	\$0.0439	\$0.0624	\$0.3013
Model 14	15	\$0.0279	\$0.0343	\$0.0033	\$0.0043	\$0.0058	\$0.0190	\$0.0371	\$0.0554	\$0.0801	\$0.3868
Model 15	13	\$0.0285	\$0.0347	\$0.0040	\$0.0047	\$0.0061	\$0.0212	\$0.0372	\$0.0561	\$0.0816	\$0.3937
Model 16	13	\$0.0357	\$0.0459	\$0.0036	\$0.0044	\$0.0061	\$0.0274	\$0.0477	\$0.0728	\$0.1069	\$0.5159
Model 17	13	\$0.0343	\$0.0432	\$0.0041	\$0.0047	\$0.0061	\$0.0249	\$0.0458	\$0.0692	\$0.1006	\$0.4856
Model 18	13	\$0.0419	\$0.0550	\$0.0039	\$0.0046	\$0.0061	\$0.0318	\$0.0567	\$0.0867	\$0.1271	\$0.6133
Model 19	15	\$0.0262	\$0.0312	\$0.0038	\$0.0045	\$0.0058	\$0.0189	\$0.0343	\$0.0509	\$0.0734	\$0.3542
Model 20	16	\$0.0292	\$0.0361	\$0.0033	\$0.0042	\$0.0055	\$0.0214	\$0.0386	\$0.0580	\$0.0841	\$0.4061

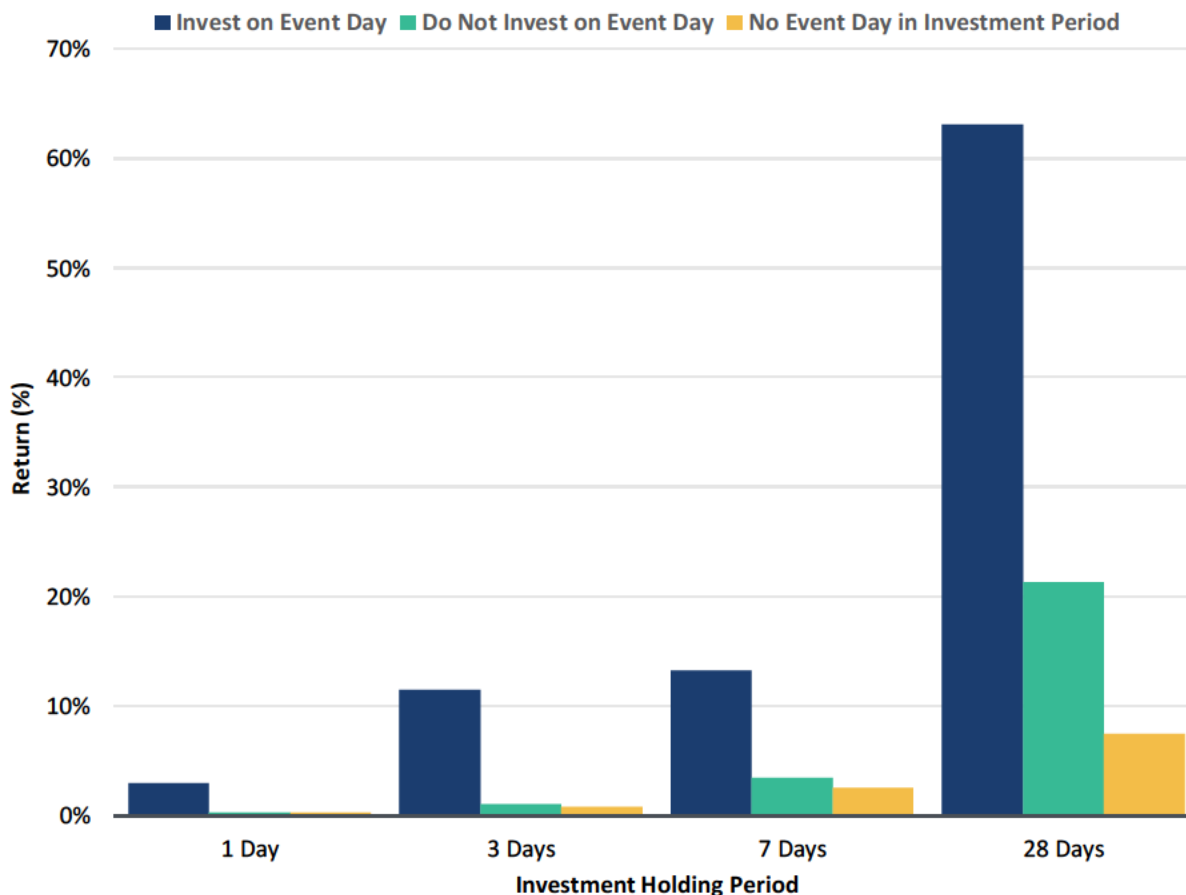
19. These results clearly demonstrate the substantial impact that even a few significant returns relating to news and public announcements about Ripple have had in the history of XRP prices.

IV. Investment Returns around Ripple Events are Substantially Greater than Otherwise

20. To further address the economic significance of the Ripple Events on XRP prices, I answer the following questions: what would the average return be if an investor bought at closing prices before each of the 100 Event Days, and how would that compare to the average return if she did not?
21. To answer those questions we must specify the holding period of that investment. I consider periods of 1, 3, 7, and 28 days. When comparing the average return for the 100 Event Days to the average return for all other days, the latter may still reflect some benefit from Ripple Events as the holding period will sometimes include an Event Day. To truly isolate the influence of Ripple Events on investment returns, I also calculate the average return considering holding periods which do not contain any Event Days.

22. The results are presented below in Figure 6. For example, an investor investing on the Event Day (i.e., purchasing at the closing price of the day before) would earn an average 28-day return of 63.1% compared to an average return of 21.3% earned when investing on any other days. Excluding those 28 day holding periods which include Event Days, the average return falls to just 7.5%.

FIGURE 6: AVERAGE RETURN ON INVESTMENT COMPARISON



23. The data supporting Figure 6 are presented below in Figure 7.

FIGURE 7: AVERAGE RETURN ON INVESTMENT COMPARISON (DETAIL)

	Holding Period			
	1 Day	3 Days	7 Days	28 Days
Invest on Event Day	3.0%	11.5%	13.2%	63.1%
Do Not Invest on Event Day	0.3%	1.0%	3.5%	21.3%
No Event Day in Investment Period	0.3%	0.8%	2.6%	7.5%

24. An investor who timed investments in XRP around these Ripple Events would have earned substantially greater returns than an investor who did not. This, again, demonstrates the economic significance of the Ripple Events in the history of XRP prices.

Additional Documents Relied Upon

Expert Reports		Date
[1]	Expert Report of Daniel R. Fischel.	November 12, 2021
[2]	Expert Report of M. Laurentius Marais, PhD.	November 12, 2021